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2007

# ECOTOUR<sup>®</sup>

of the Trans-Canada Highway

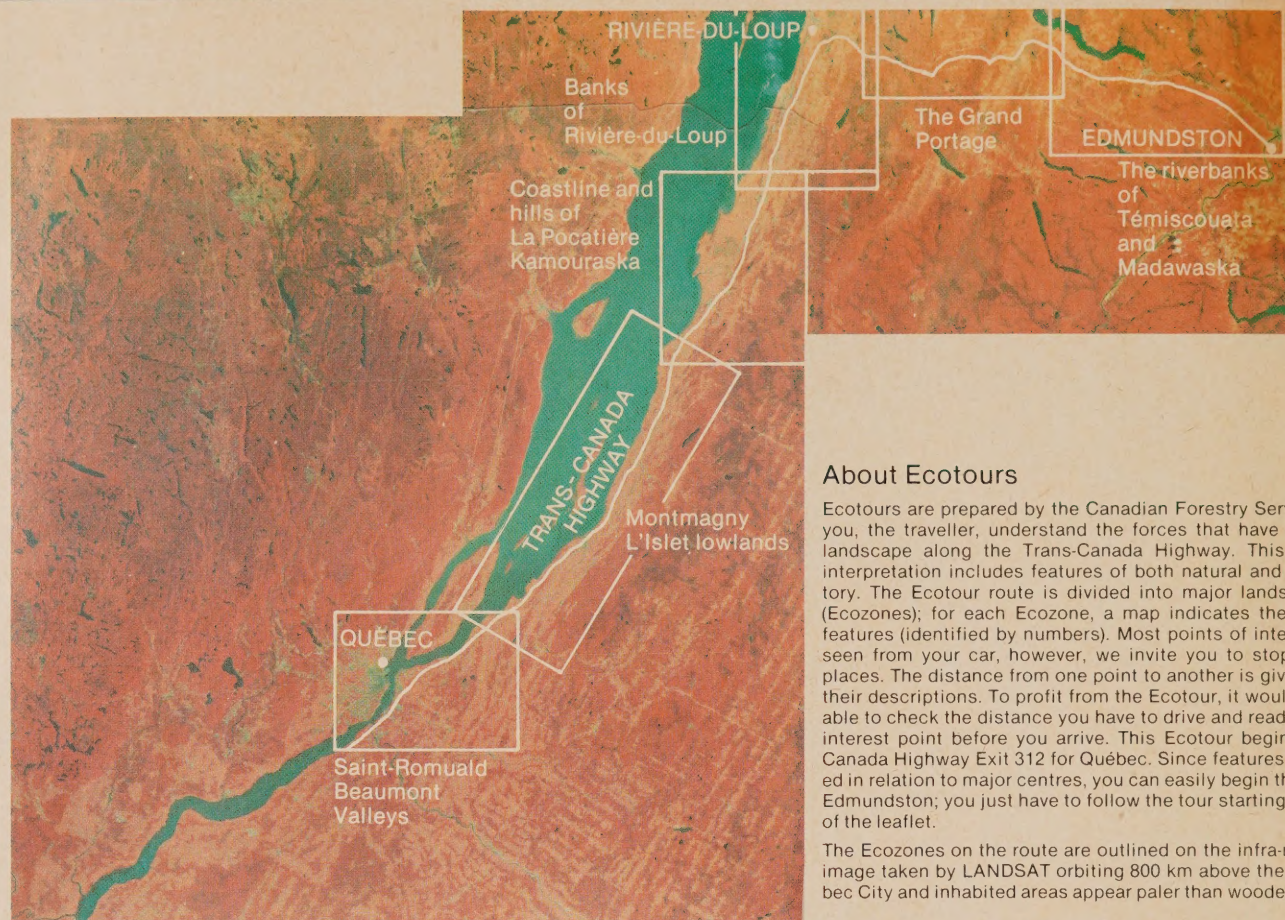
## Québec City - Edmundston

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Canada





## About Ecotours

Ecotours are prepared by the Canadian Forestry Service to help you, the traveller, understand the forces that have shaped the landscape along the Trans-Canada Highway. This ecological interpretation includes features of both natural and human history. The Ecotour route is divided into major landscape types (Ecozones); for each Ecozone, a map indicates the ecological features (identified by numbers). Most points of interest can be seen from your car, however, we invite you to stop at several places. The distance from one point to another is given between their descriptions. To profit from the Ecotour, it would be preferable to check the distance you have to drive and read up on each interest point before you arrive. This Ecotour begins at Trans-Canada Highway Exit 312 for Québec. Since features are indicated in relation to major centres, you can easily begin the tour from Edmundston; you just have to follow the tour starting at the back of the leaflet.

The Ecozones on the route are outlined on the infra-red satellite image taken by LANDSAT orbiting 800 km above the earth. Québec City and inhabited areas appear paler than wooded areas.

The Trans-Canada Highway between Québec City and Edmundston spans 300 km that are certainly among Canada's richest in terms of history, as well as some of its most picturesque. Here, modern Canadian history began, and the major geographic components of Québec are found. The Canadian Shield, the Appalachian Mountains and the St. Lawrence Lowlands all meet near Québec City.

During the last ice age, the weight of the glaciers caused part of the continent to sink below sea level; when the glaciers melted about 11 000 years ago, the waters of the Atlantic Ocean flooded the lowest areas. The sediments deposited on the beds of these new seas, including the Champlain Sea, gave birth to the soils of today. Freed from the weight of the glaciers, the continent rose and the waters receded until the vast St. Lawrence river system was initiated 6 000 years ago. Vegetation, wildlife and then man appeared on the new lands. Of these, man has undoubtedly shaped his immediate environment most obviously, or at least in our view, most strikingly.

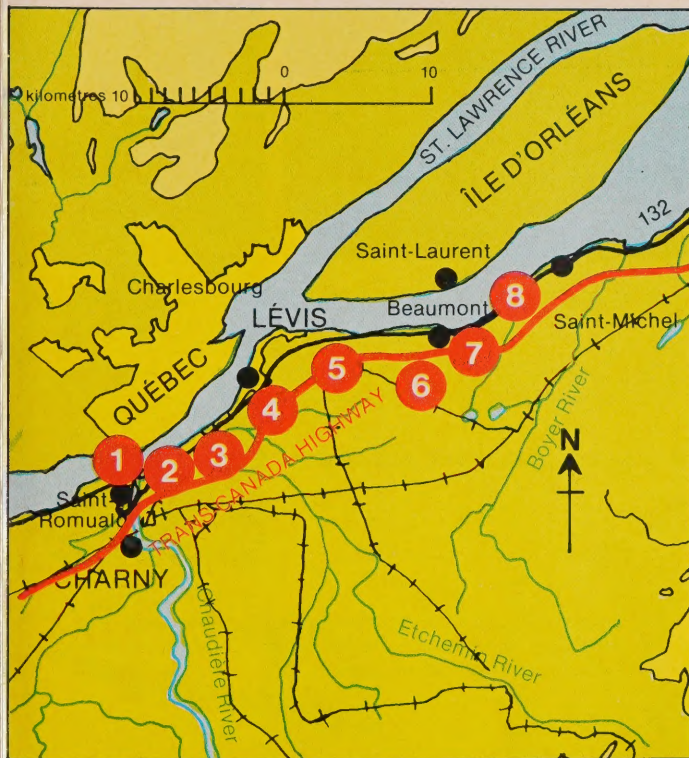
The area crossed by the Trans-Canada Highway between Québec City and Edmundston was occupied several thousand years ago by the Inuit and the Amérindiens who came from Asia, and was then visited through the centuries by a succession of explorers and fishermen. It was developed and was transformed by the arrival in the 17th century of Europeans, mainly French and English, who settled along the St. Lawrence River.

Despite the harsh climate, the Europeans came to stay, trading in furs with the Indians, colonizing the rich arable lands of the St. Lawrence Valley and clearing the surrounding forests for farming. This dual forestry and farming economy has endured for almost three centuries. The French population grew rapidly, expanding northwards through the hinterland and east of Québec City, greatly outnumbering the scattered pockets of English-speaking settlers.

Towards the end of the 19th century the economy diversified and urbanization gathered momentum while industry, commerce and service enterprises forged ahead of rural activities. Slowly, tourism grew in importance due to the beauty of the area, its history, and the population which forms a French enclave in North America. These factors have, in their own way, given a unique character to the various landscapes and points of interest that we invite you to discover along the Trans-Canada Highway between Québec City and Edmundston.



# Saint-Romuald — Beaumont Valleys



All along the St. Lawrence River the terrain has been shaped by differential erosion, a phenomenon whereby the natural forces of wind and water wear away the hardest rocks less rapidly than the others. The resulting hills and vales invariably follow the river's path; when the highway leaves the river, it must cross rocky ridges.

This zone, because of its proximity to Québec City, is the most industrialized along our route. Its mammals have adapted to the presence of humans: groundhogs, squirrels and racoons are common in this environment.

From Lévis to Beaumont, industrialization is replaced by fields and farms. The barn swallow is one of the bird species which benefited most from the clearing of forests and the advent of farming in North America. Usually, each farm harbours several pairs of barn swallows during the summer months. Examine the buildings carefully during your trip. The vast majority of these swallows build their nests only on man-made structures such as sheds and cottages.

The end of this zone coincides with the eastern limit of the Laurentian maple forests, a climatic region in which mild weather conditions favour the growth of maple and yellow birch stands. Most of the forests seen from the highway are mixed hardwood and softwood forests. The farther north one goes, the greater the proportion of softwoods.



Aerial view of the Pierre-Laporte and Québec bridges.

1

0.4 km

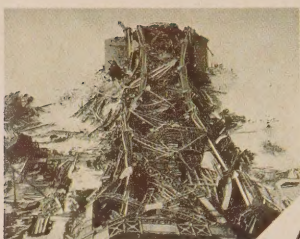
The Québec and Pierre-Laporte Bridges are visible to the north. The first was long awaited by the residents on both shores in the Québec City area who already felt in 1850 that the ferry system between Québec City and Lévis was inadequate. Construction began on the Québec bridge in 1906 and it collapsed twice during construction, killing 83 workers.

In 1907, a design error caused the collapse of the structure on the south shore. Then, in 1916, as the centre span was being hoisted into place, it broke away from the lifting links and fell into the river. Finally, in 1917, the bridge was completed and opened to railway traffic. A road for motor vehicles was added in 1929 to the two railway tracks. It is still the longest cantilever bridge ever built. The centre

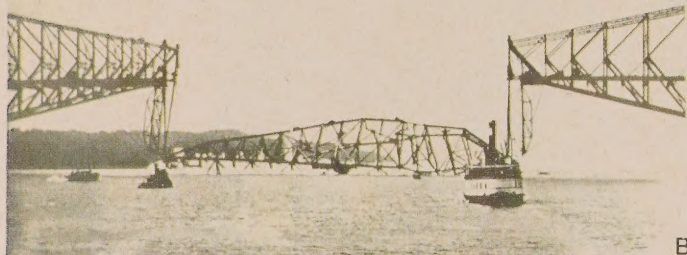


The Phoenix Company bridge before it collapsed.





A. The remains of the bridge, August 29, 1907. B. Falling centre truss, September 11, 1916.



B

span is suspended without cables and is held up by two diamond-shaped cantilever arms. During the summer, about 30 men work every day painting the bridge.

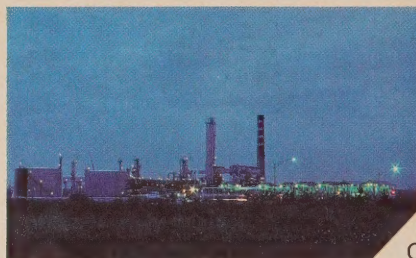
The Pierre-Laporte Bridge was built because the Québec Bridge no longer met traffic demands. Construction began in 1966 and the bridge was completed in 1970. It was the first suspension bridge in Canada supported by cables of parallel wires. Its two pylons are as tall as a 35-storey building. The two main cables are each made up of 12 580 steel wires and have a load capacity of 16 129 tons. They are attached to two anchor blocks perched atop the cliffs on either side of the river. These blocks are so large that a huge concert hall could be built in each of them. The Pierre-Laporte Bridge has six traffic lanes and can accommodate 90 000 vehicles daily.

1.2 km

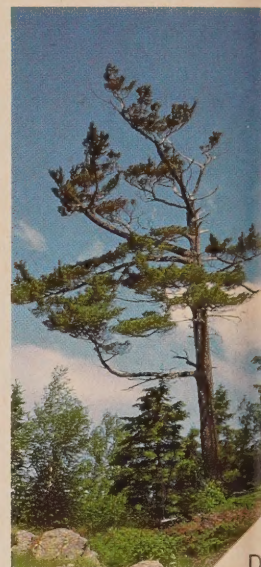
2

On a rocky ridge to the north, a few white pines remind us that this species was once widely distributed throughout the region. A soft, easily worked wood, white pine was used extensively by carpenters and cabinet makers of New France. Today, this pine furniture is highly prized by antique lovers.

At one time under the French regime, the white pine stands of "Lower Canada" were reserved for the royal navy. But in the 19th century, stands were decimated because England was unable to obtain raw materials from Europe due to Napoleon's continental blockade.



C. Ultramar oil refinery.  
D. White pine.



D

White pine does not regenerate readily in full sunlight and is subject to attack from insects, fungi and other natural enemies, further explaining its present scarcity.

3

6.6 km

The storage tanks of the Ultramar oil refinery can be seen to the north. Built on 182 acres in Saint-Romuald, the refinery was opened in 1971. Its harbour can accommodate tankers of 100 000 tons. Venezuela is its main source of crude oil, followed by the Middle East, Mexico and western Canada. The crude is pumped from ships anchored in the St. Lawrence to the refinery via pipeline.

The refinery has a capacity of 110 000 barrels-per-day. Its principal products are heavy fuel oil, heating oils, diesel fuel, automotive gasoline, butane and propane. About 250 people work here. Its economic impact on the area is considerable as it also generates a good deal of indirect employment.

4

6.8 km

Built in 1871 by the British army, hidden and nearly invisible, Pointe Lévis Fort No. 1 was part of the Québec City defence system and was designed to counter the possibility of an American attack via the



Chaudière River Valley. Of the three original forts, which were never used, only Pointe Lévis Fort No. 1 remains.

The Montmorency Falls and Québec City are visible from its parapets. A historical monument restored by Parks Canada, the fort is located on Chemin du Gouvernement.

6

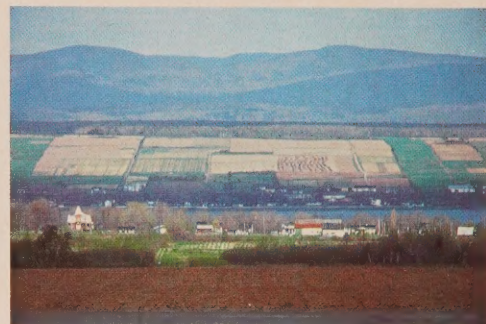
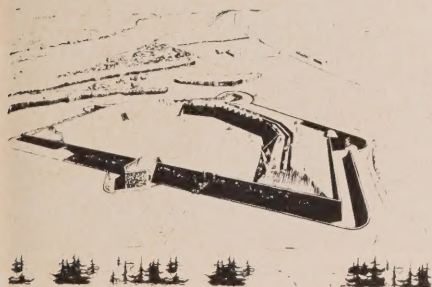
10.4 km

You may have noticed beige cattle in the fields. These Charolais cattle are bred on the farm just south of the highway. The Charolais is a beef breed originating in the town of Charolles, France, and is one of the oldest breeds of cattle in Europe. They are known for their fast growth and the quality of their meat, which is lean, yet well-marbled, so that it remains tender during cooking and has excellent flavour.

The breed was first introduced to North America in Mexico in 1930 and all Charolais cattle in North America were descended from the initial Mexican herd until 1967, when direct imports of Charolais from France began. However, their entry into this country was restricted because of the risk of bringing in cattle with certain infectious diseases, such as foot-and-mouth disease, that are widespread in Europe.

#### Fort Lévis N° 1:

4.3 km from the highway. Take Exit 327 to Lauzon, pass the traffic lights, turn left on *Champagnat est*, then immediately left on *Chemin du gouvernement*.



Pointe Lévis Fort No. 1

Charolais cattle.

Landscape on the Île d'Orléans.

5

4.0 km

The three high-tension lines (735 000 volts) passing over the highway carry electricity over 1 203 km, from the Churchill Falls and Manicouagan-Outardes hydroelectric complexes to Montréal.

This type of structure is often encountered in the Québec countryside. The distance spanned between two towers by such wires is often impressive. For example, where the lines cross the St. Lawrence over Île d'Orléans, the span between the St. Lawrence village, Île d'Orléans and Beaumont suspension towers is 1 584 m. This distance is exceeded only at the Saguenay River crossing where the span is 1 791 m.

These lines, with a capacity of 1 000 to 2 000 megawatts each, can supply electricity for 3 000 000 people. The electricity they carry supplies the Québec City area and the south shore at Montréal.

7

2.6 km

There is an inviting highway rest stop a few kilometers beyond the Beaumont exit. During summer, the cool and refreshing shade of the maple stand harbours birds characteristic of the St. Lawrence Lowlands such as the eastern wood pewee, the red-eyed vireo and the ovenbird.

Northwards, the landscape opens majestically towards the St. Lawrence and the Île d'Orléans, with a grassy slope in the foreground leading down to a village among fields and rail fences. This peaceful bit of land, typical of the region's farming areas, is the home of several enthusiastic songbirds. The bobolink, a black bird with yellow nape and white back, sings over the hayfields; only the American goldfinch is more voluble, tirelessly uttering its plaintive cry in its roller-coaster flight from one field edge to another.

2.7 km





Aerial view of the range roads or rangs on the South Shore.

8

The landscape of the Île d'Orléans displays the system used by the French to colonize lands along the St. Lawrence and which differs considerably from the British system of townships used elsewhere in Canada.

In the 17th century, the King of France decided to populate New France. He made land concessions to *Seigneurs* who were required to settle these concessions with farmers who would clear and cultivate the land. Each settler was assigned a lot: a narrow and very long plot of land, averaging 15 hectares (about 37 acres). These parallel lots were laid out perpendicular to the St. Lawrence, the sole means of communication at the time. The settlers built their houses near the shore.

When the shore was occupied, a road was built behind the first series of lots and a second series of lots with the same orientation as the first was established along the road. Such lots and houses were laid out in "ranges" or *rangs* which identify the road and the corresponding strip of land. The process was repeated as required by the arrival of new settlers. The farther the "range" is from the St. Lawrence, the more recent its origin.



Aerial view of the village square in Charlesbourg (1950).

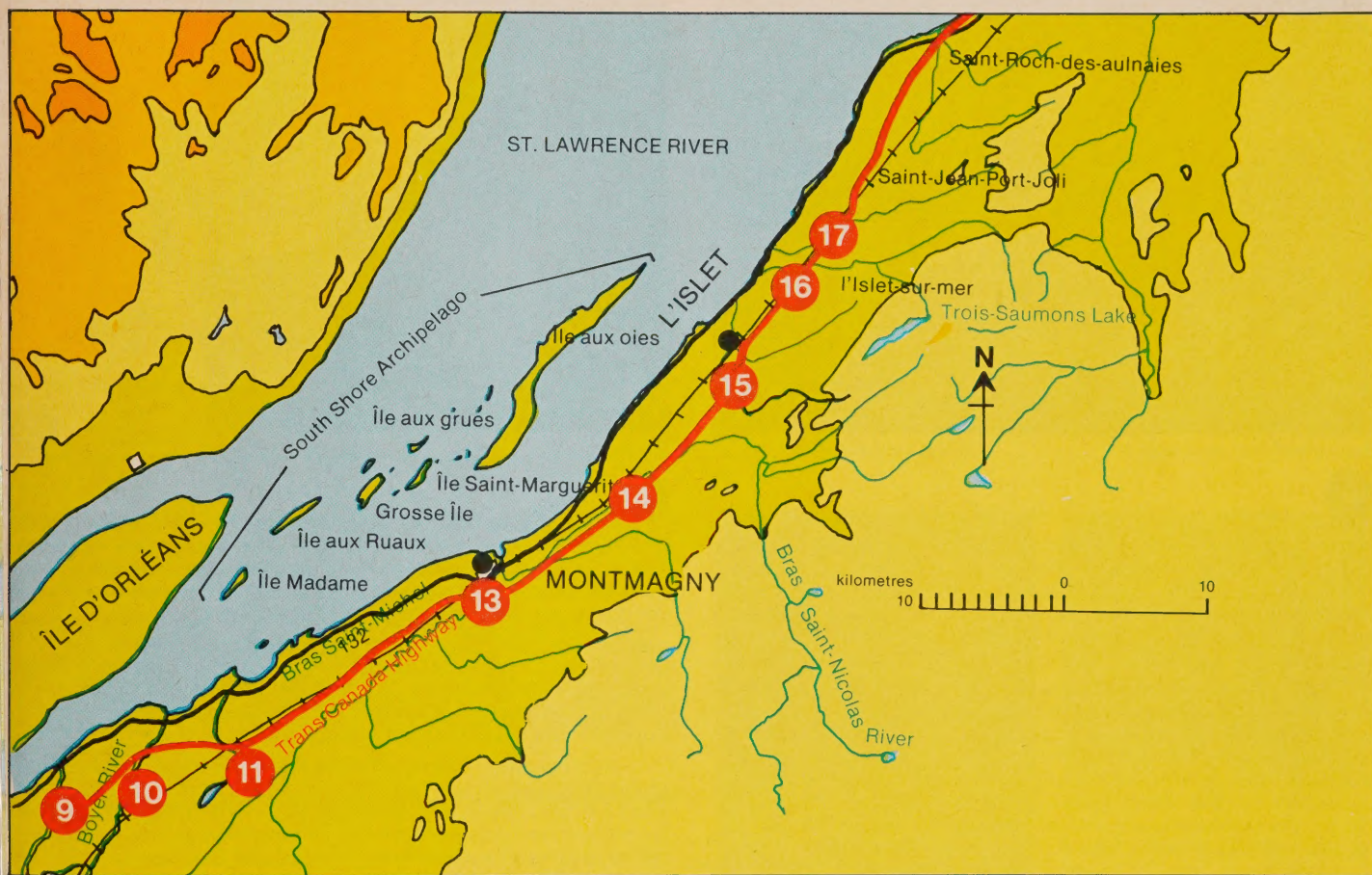
In 1663, King Louis XIV, concerned that the settlers were scattered, ordered his intendant, Jean Talon, to group them into villages or *bourgs* according to French custom. This resulted in the village square that can still be seen in Charlesbourg, a Québec City suburb. However, the settlers did not follow through with this approach because each family needed direct and immediate access to the St. Lawrence or to another major river, such as the Chaudière. Not only did these moving highways make travelling easier than in the forest, but fishing was also vital for survival.

Whether intentionally or not, colonization by *rangs* and lots ensured a certain equality in terms of farm productivity. The lower section of a lot, generally of clayey or alluvial soil and therefore quite fertile, was cleared. The back of the lot, often higher, rocky ground and more difficult to cultivate, was not cleared. This farm woodlot provided each settler with his share of wood for construction and heating and served as a source of game.

1.3 km



## Montmagny — L'Islet Lowlands



The St. Lawrence widens suddenly at this point, from 1 km at Québec City to 12 km at l'Islet-sur-Mer. From the Île d'Orléans to Rivière-du-Loup, the Ecotour takes you through the middle estuary of the St. Lawrence. Because this portion of the estuary is the traditional migratory resting place of the snow goose, the Canadian Wildlife Service manages two sanctuaries, Saint-Vallier Bay and Montmagny Marsh, as well as a National Wildlife Area on the North Shore at Cap Tourmente.

At this point, the waters of the St. Lawrence are a mixture of fresh and salt water. Closer to the Atlantic, the proportion of seawater is higher. The *Scirpus* marshes are at their eastern limit here because *Scirpus* is a marsh grass that cannot tolerate seawater. These typical freshwater marshes are among those harbouring the greatest variety of waterfowl in Québec.

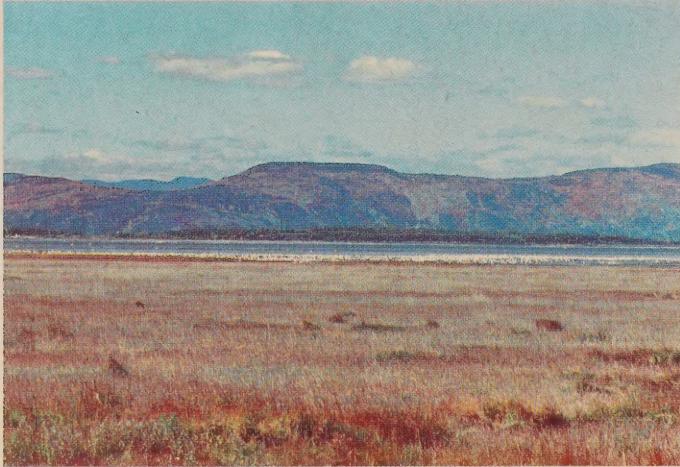
Along Highway 132, running parallel to the Trans-Canada Highway, are many small, picturesque villages near the St. Lawrence east of Montmagny. Take time out for a peaceful sidetrip into the past before resuming your trek along the Ecotour route.





Bank swallow.

Belted kingfisher.



Snow geese near Montmagny.

9

When the weather is clear, a group of islands known as the South Shore Archipelago (Île Madame, Île aux Ruaux, Grosse-Île, Île Sainte-Marguerite, Île aux Grues and Île aux Oies) are visible in the distance. These islands are fine hunting grounds for waterfowl such as snow geese, Canada geese and ducks. This is the only area in southern Canada where the snow goose may be hunted.

Hunting was not controlled before 1900 and the snow goose population had diminished to about 3 000. The Migratory Birds Convention signed in 1916 between Canada and the United States restricted hunting to the fall. By 1920, the population had doubled. Between 1931 and 1980, snow goose hunting was banned completely in the eastern United States and it was hunted only in Québec and in the Arctic. Thanks to these regulations, snow geese increased from 18 000 in 1940 to 40 000 in 1950 and to over 200 000 in 1979.

At one time, the island of Grosse-Île was a quarantine centre used to prevent the introduction and spread of Asiatic cholera, then rampant in Europe. In 1845, typhus broke out at sea among Irish immigrants who had left their country to avoid the potato famine. Eight thousand died at sea and over 5 000 at the lazaret\* on the island. This service was abolished in 1937 and Grosse-Île is now administered by Agriculture Canada as a quarantine station for livestock.

2.0 km



\* Lazaret: a harbour facility for hygienic control and isolation of contagious diseases.



Red schist.

10

The Boyer River runs down a preglacial valley that was carved more than 30 m below present sea level and was then partially filled with loose material left behind by glaciers and the Champlain Sea.

The sandy escarpment, visible from the highway, is a preferred habitat of the bank swallow and the belted kingfisher. The bank swallow nests here each summer in colonies, camouflaging its nests by burrowing into the bank. Over 30 pairs fly about this escarpment like a cloud of insects all summer long. Swallows catch insects in full flight, often skimming spectacularly over fields and river.

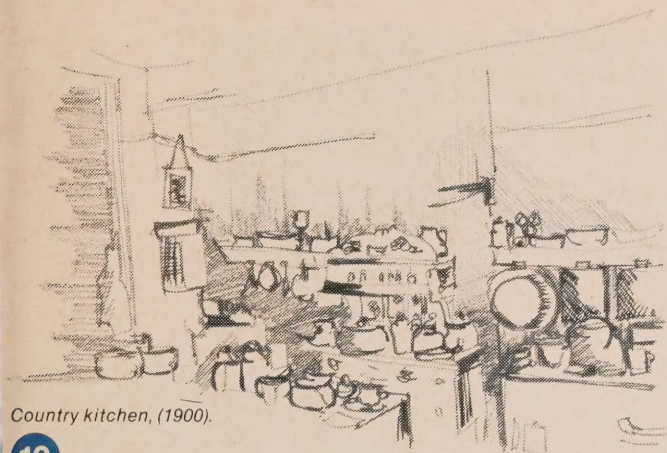
Although the belted kingfisher's habits are fairly similar to those of the bank swallow in terms of nest construction and site selection it is a solitary-nesting bird. Moreover, as its name indicates, it feeds on fish and its catches often frustrate weekend fishermen who sincerely believe, after a few fruitless hours, that there are no fish in the river.

9.6 km

11

Here the highway cuts through outcrops of red slaty schist. Because of their layered structures, schist formations are broken up by congelifraction. This splitting is caused by freezing of infiltrating water. Root penetration also cause fragmentation into slabs that accumulate as steeply sloping talus.





Country kitchen, (1900).

12

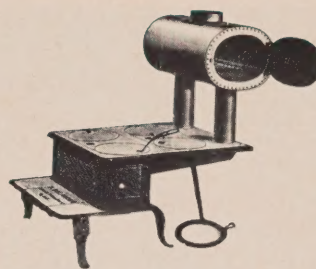
Established in 1867 by Amable Bélanger, the Montmagny foundry produced cast-iron stoves that were known throughout eastern Canada. During this era, the stove was the focal point of every kitchen and the kitchen was the most important room in the house. The stove provided heating and was used for cooking; meals were prepared on the stove top or in the oven. The upper section served as a warming oven heated by the stove pipe running through it. Beside the firebox was a reservoir which supplied hot water and acted as a humidifier. The foundry produced a great many models of wood stoves, wood- and coal-fired furnaces, bread ovens, "farm kettles", sugaring-off vats, plows and harrows.

17.0 km



A Colon

B Bijou



C Cuisine

A.B.C. Models of wood stoves made by the Amable Bélanger foundry.

13

The Des Perdrix River with its tree-lined shores is a rare example of a landscape that was once characteristic of the St. Lawrence Valley. The American elm, a majestic tree, once lined the borders of our fields. Since the 1940's, unfortunately, Dutch elm disease has been decimating the species and spreading irresistibly. Only a few large trees in this row are healthy.



A



B

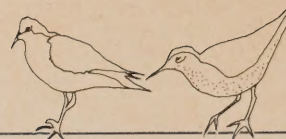
A. Healthy elm. B. Elm attacked by the Dutch elm disease.

A microscopic fungus carried by bark beetles kills trees by blocking the vessels in which sap circulates. Today, scientists have developed techniques to curtail the disease in individual trees, but there is little hope that future generations will know the pleasure of strolling down a country lane under a shady canopy of elms. Only isolated trees persist and the high cost of treating each tree prohibits province-wide or county-wide control.





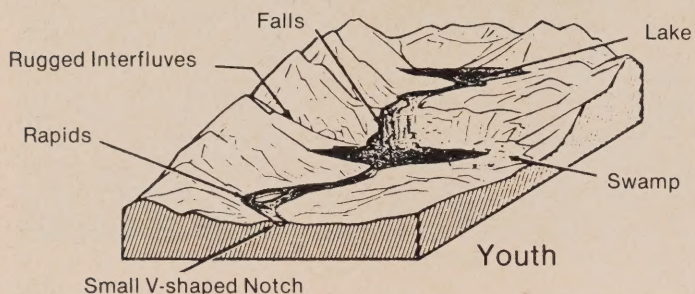
Northern oriole.



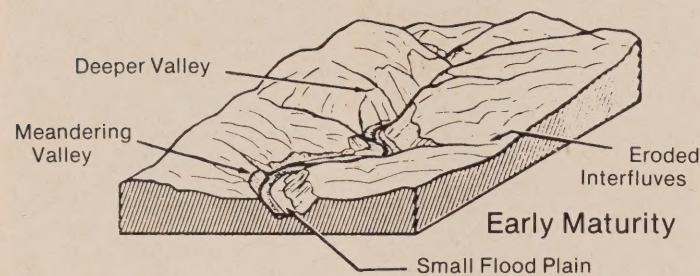
Spotted sandpiper.

The Baltimore oriole, symbol of a famous baseball team, often suspended its nests from the tip of one of the descending branches that form the characteristic umbrella of the American elm. Fortunately, this bird has managed to adapt itself to other tree species, avoiding another casualty in this ecological tragedy.

14.2 km

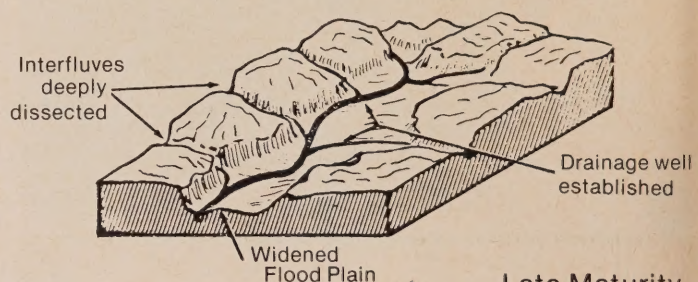


Youth

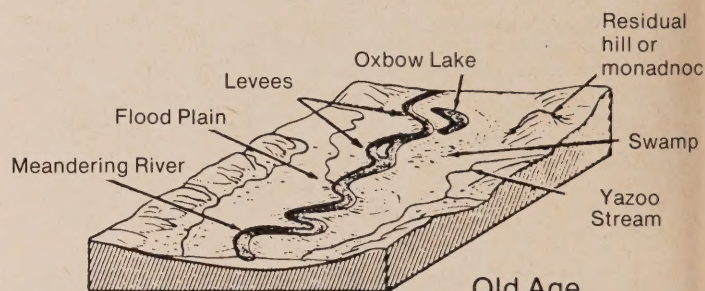


Early Maturity

Four stages in the life Life History of a stream.  
(© The Macmillan Company of Canada Limited 1979).



Late Maturity



Old Age

14

The Bras Saint-Nicolas River cascades along bedrock in a gorge 5 m deep carved out when the glaciers and the Champlain Sea receded. This postglacial valley is still in its initial stage; since the gradient of the river is pronounced, the current is still quite strong and the riverbed is exposed to vertical erosion. In a few million years, the profile of equilibrium will be achieved: erosion will shift to the shores and the river will start meandering.

The proximity of the river can always be detected by an increase in the variety of birds. The shores of the Bras Saint-Nicolas River and rocky outcrops dotting its course attract the spotted sandpiper, which moves from rock to rock in jerky flight. Ducks also frequent these wooded shores, accompanied by cedar waxwings, yellow throats and alder flycatchers.

8.6 km

15

Over the past three centuries, l'Islet-sur-Mer has given us many mariners who have sailed the world's oceans. One such man is Captain Joseph-Elzéar Bernier, who took command of his first ship in 1896. He claimed all the Arctic Islands on behalf of Canada.

The Bernier Marine Museum has been set up in his memory. Located 5 km from the Trans-Canada Highway, the museum presents many aspects of navigation in its numerous display rooms. The sailor's world is depicted from the 16th to the 20th century with particular emphasis on the Second World War, major ship disasters, and Captain Bernier's souvenirs. The "cabin boys' corner", built to satisfy the curiosity of children, is also open to parents.





A



B



C

A. The ice-breaker Ernest Lapointe, l'Islet-sur-Mer.  
B. Stone fences. C. Church, Saint-Jean-Port-Joli.

16

There are stone piles in the fields on each side of the highway. Sometimes, a large erratic block can be seen in the middle of a lot.

The deposits from the last glaciation contain many stones of various sizes up to large boulders. The stones were obstacles to plowing and, when possible, were removed by farmers and piled along the edges of fields, forming stone fences.

7.8 km

17

Exit 414 North leads to Saint-Jean-Port-Joli, an artists' town on the shore of the St. Lawrence. Called the capital of arts and crafts, Saint-Jean-Port-Joli has the highest concentration of wood carvers of any locality in North America. In addition to watching the craftsmen at work, visitors can obtain many unique hand-crafted objects. You can also enroll in a one-week introductory wood carving course.

15.6 km

7.6 km

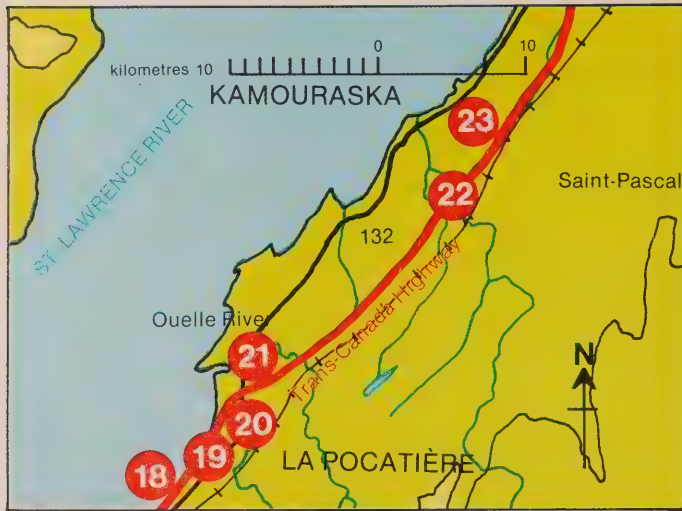
**Bernier Museum:**  
5.0 km from the highway. Take Exit 400 to l'Islet, turn right at the end of the exit road. The museum will be at your left.

Beside the museum, the icebreaker Ernest Lapointe is open to visitors during the summer. Designed to break a continuous two-foot layer of ice at a speed of three knots, the Ernest Lapointe, despite its impressive appearance, was retired in 1978 after 39 years of service because of high operating costs. You can explore the ship from the Captain's cabin to the galley and admire the complexity of its steam engines.

Icebreakers are used on the St. Lawrence to keep the navigation channel open as far as Montréal and to prevent flooding caused by ice jams which occur when large ice cakes, driven by wind and tide, pile up where the St. Lawrence narrows.



## Shoreline and Hills of La Pocatière — Kamouraska



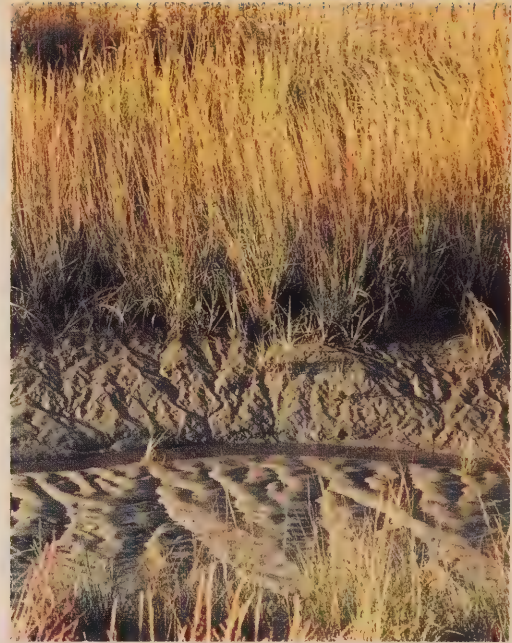
A boat in the yard, fishing gear stored near barns and other fishing paraphernalia remind us of the importance of St. Lawrence to the area. Fishing provides farmers with a good second income.

For the first time on the Ecotour, we are truly travelling along the edge of the St. Lawrence, although it is almost hidden from view by the dikes or *aboiteaux* built to prevent salt water from flooding farmland reclaimed from the river. Eels are fished from the shore; the *Spartina\** marshes indicate the transition from fresh to salt water.

Beyond La Pocatière, the highway crosses farmland. People take farming seriously here and innovation is typical. Since the last century, agriculture research centres have made La Pocatière known beyond our borders.

Cedar stands were much more abundant at one time. Cedar wood is water resistant, and farmers used it for outdoor construction. Buildings covered with cedar shingles and old cedar rail fences are often seen and, even today, cedar posts are used for wire fences.

Near the Kamouraska hills, keep an eye out for crows and ravens (two distinct species, contrary to popular belief); they are often harried in their nonchalant flights over fields and woods by a cortege of small birds such as red-winged blackbirds which replace each other every 100 m. This is the small birds' way of protecting their young from the voracious appetites of these predators who, given the opportunity, would swallow an entire clutch or brood without hesitation.



*Spartina Marsh*

18

A *Spartina* marsh, a characteristic of this area, lies to the north. It alone accounts for 95 percent of Québec's *Spartina* marshland. This type of marshland is very rare in Québec. Its total area is estimated at about 4 300 ha (1/5 of the size of Îles-de-la-Madeleine).

In addition to being a vital habitat for several migratory bird species, such marshlands play an important role in the natural balance of our environment. They filter its water and contribute through their high productivity to the food chains upon which our valuable fisheries and related industries depend.

If you stop at Exit 436, you will have a more detailed view of this marsh from high ground. Throughout the marsh are scattered countless small ponds formed by the combined action of ice and tide tearing away sections of the plant cover. Here two major species of *Spartina* grow: *S. alterniflora* (Salt water Cordgrass) and *S. patens* (Salt meadow Grass).

\**Spartina*: type of marsh grass found on marine shores.





Great blue heron.



Black-crowned night heron.



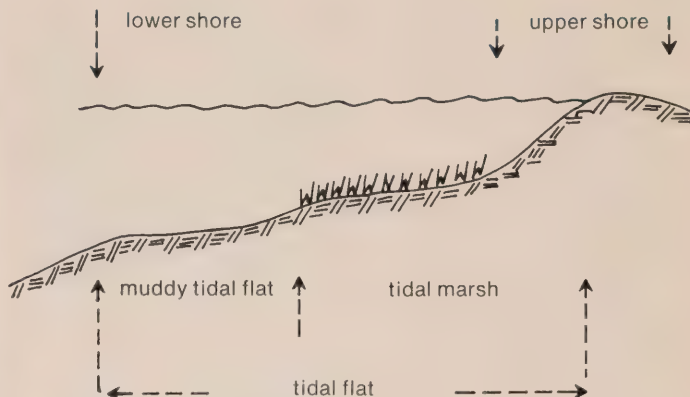
Aerial view, South Shore of the St. Lawrence; greyish-brown tidal flat and green tidal marsh dotted with tiny ponds.

At low tide, the tidal flat attracts many seasonal shore birds such as sandpipers and plovers. With a bit of luck, you will see a great blue heron fishing for halibut or a black-crowned night heron in wait at the edge of a pond, concentrating on the movements of tiny fish called sticklebacks which are a favorite part of its diet.

5.2 km



A. *S. Alterniflora* (Salt water Cordgrass).  
B. *S. Patens* (Salt meadow Grass).



Zonation of the St. Lawrence Shoreline.



Along the south shore of the St. Lawrence, the shoreline is formed of sediments transported by the river's tributaries. The water and sediments from tributaries of the St. Lawrence flow along the shore instead of mixing with the river's main body. For thousands of years these muddy sediments have interacted with currents and tides shaping the shoreline.

The lower shoreline or strand is divided into two parts: tidal flat and tidal marsh. The tidal flat is a muddy zone unsuited to vegetation because it is often submerged. Vegetation has become established on the tidal marsh; the various plant species appear gradually, depending largely on the duration of tidal flooding.

2.2 km

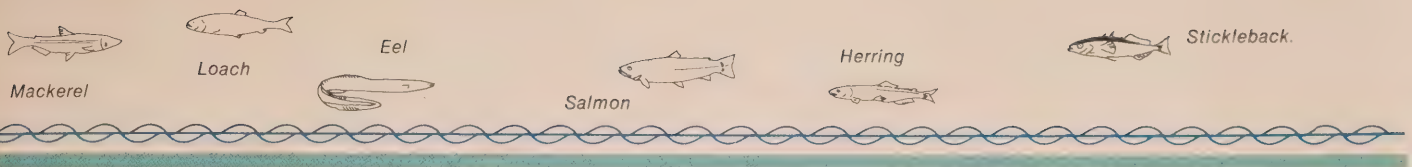


La Pocatière Agricultural Institute.

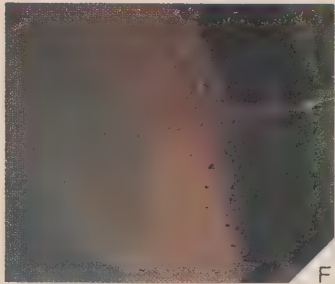




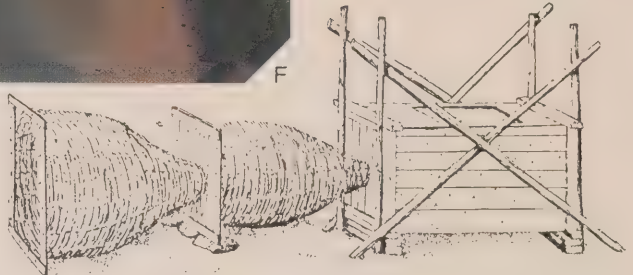




A. Ouelle River. B. Smokehouse, Île-Verte.



F. Aerial view of an eel trap. C. Eel trap: funnel, wicker, lead, box. D. Weir (branches woven through pickets). E. The working eel trap. (The illustrations on this page are from *Rivière-du-Loup et son portage*, Paul-Louis Martin et collaborateurs, Éditeur officiel du Québec, 1977).



The Ouelle River has been frequented since early colonial times. Navigable for a few kilometres, it provided much-needed shelter for vessels. The area was first settled in 1672. By 1698, beluga whales were hunted commercially for oil used as a lubricant.

At one time, salmon spawned in large numbers in the Ouelle River, providing fishermen with a substantial income; their annual catches sometimes exceed one thousand fish. After the installation of a sawmill at Saint-Pacôme, the river became so polluted with wastes that salmon could not survive. In 1874, the possibility of establishing a hatchery to restock it was considered, but the inhabitants refused because it would have meant abolishing sawmills that were then their principal industry.

Today, eels are the most important commercial fish. Eels come down the estuary to breed in the Atlantic and linger at Rivière-Ouelle. In October, eel traps are installed on the strand\*. In 1970, the mercury content in eel flesh brought eel fishing to a halt; however, the ban has since been lifted.

Downstream from Notre-Dame-du-Portage, the principal catch is herring which is treated in smokehouses. Herring and eel have a nutrient value equal to that of pork. Smelt, capelin, tomcod, perch and longnose sucker are also fished.

## 22

A lookout allows you to take a closer look at one of the area's most remarkable features: the Kamouraska lowlands. They have the peculiarity of being dotted with a series of isolated hills of hard rock which resisted the erosion that lowered the level of the surrounding land.

Rarely more than 80 m high and 700 m across, these residual hills or monadnocks are distributed in several more or less parallel lines.

Quartzite, which forms most of the monadnocks, is a rock with a fine and regular grain, clear, with a nearly white surface caused by weathering. In spots, the quartzite contains dolomitic sandstone nodules, some of which are 60 cm in diameter. Where these nodules are exposed to the elements, they weather more rapidly than the rest of the rock giving it a pitted surface.

17.4 km

\*Strand: portion of the shoreline between the highest and lowest tides.



Crow.



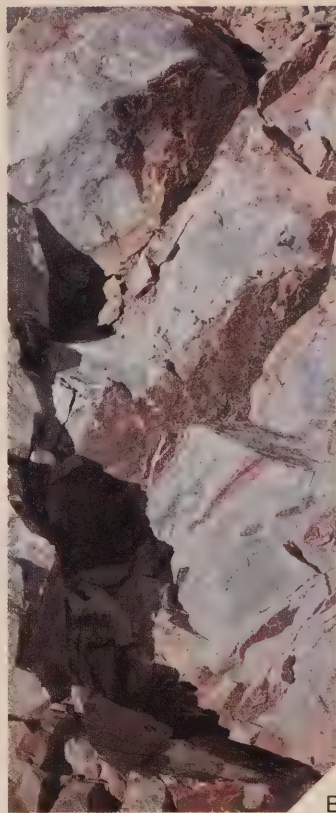
Raven.



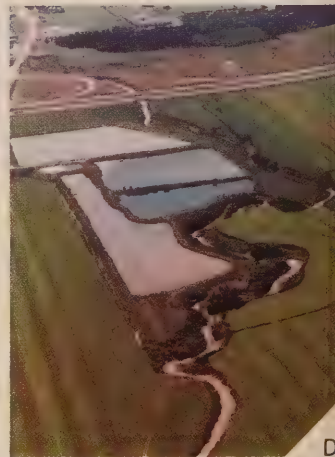
A



C



B



D

The many rocky cliffs in the area are favorite nesting sites for the common raven. This bird, resembling but definitely larger than the common crow, usually scavenges along the shore of St. Lawrence. Like the crow, however, it keeps an eye out for dead animals lying at the sides of the highway. Thousands of small animals are killed each year trying to cross our roads. Since the advent of the automobile, many bird species have adapted to this new food source, continuing the cycle through which nature has avoided waste for thousands of years.

5.3 km

A. Rocky ridge, near Kamouraska. B. Quartzite. C. Raccoon, killed trying to cross the highway. D. Artificial ponds, Saint-Pascal.

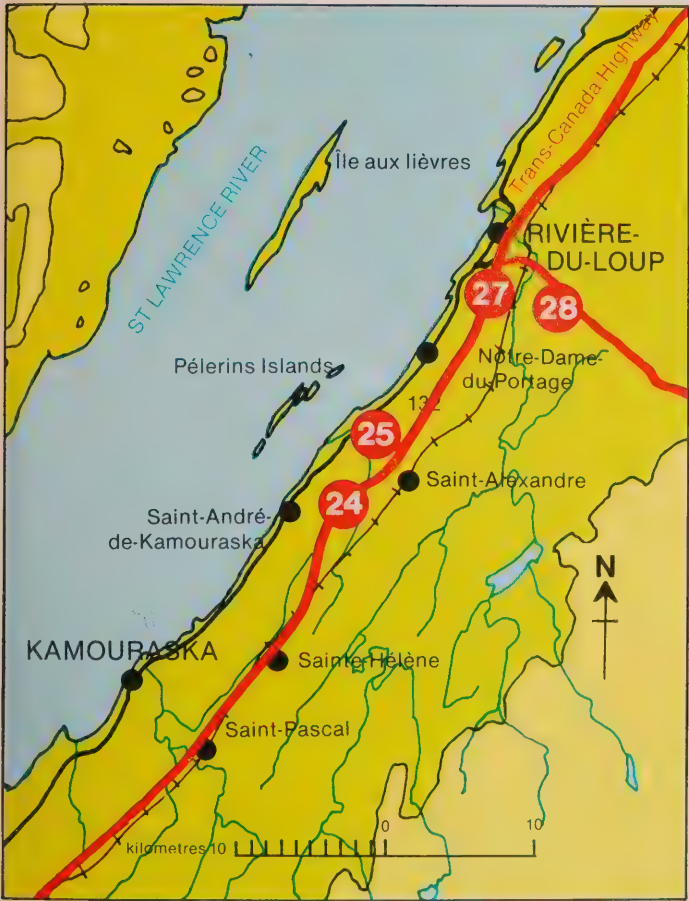
23

These artificial ponds are the town of Saint-Pascal's wastewater treatment system. The wastewater is first oxygenated by means of aerators, projecting the liquid several metres into the air for proper exposure. Then, nature does the rest. Bacteria decompose the organic matter and algae provide the necessary oxygen. The system is effective, economical and suitable for the treatment of domestic sewage.

17.3 km



# Rivière-du-Loup Shore



From Sainte-Hélène to Rivière-du-Loup, the monadnocks are replaced by peatlands and the highway climbs progressively along terraces. The cliff is very close to the St. Lawrence and villages are perched on the slopes with only a few houses crowded together at the bottom along the shore. The sea breeze provides a more maritime climate. Whales, dolphins and porpoises sometimes venture into this portion of the St. Lawrence although they are more often found along the North Shore.

If you enjoy nature, take a worthwhile detour to visit Baie de l'île-Verte National Wildlife Area. Located 30 km from Rivière-du-Loup in the direction of Rimouski, this is the only wildlife reserve in Québec where *Spartina* marshes are protected.



Le Gros Pèlerin Island.



Peat lands.





A



B. Rocky shoreline along the Pèlerins Islands. Cliffs plunge into the river.

24

The Rivière-du-Loup terraces are mostly peatlands. Although quite varied in origin, peatlands are accumulations of organic debris in poorly drained depressions, where each layer is distinguished by its degree of decomposition.

When the glaciers passed over the St. Lawrence lowlands, they dug basins in the land. Some basins became lakes of varying depths, generally parallel to the St. Lawrence, and the deepest ones, Trois-Saumons and Morin Lakes, still exist. Other shallow lakes, however, have been transformed into peatlands.

The largest peatlands are situated at Saint-Charles-de-Bellechasse, Rivière-Ouelle, Saint-André, Saint-Alexandre and Rivière-du-Loup.

The centre of a peatland is generally composed of grassy, treeless vegetation; only a few stunted black spruce and tamaracks survive in this very wet environment. As drainage improves from the centre towards the outer edges, trees grow progressively taller. Sphagnum moss plays a significant role in the growth of peatland. The wet meadow is mainly composed of members of the Cyperaceae or sedge family (slender wetland plants resembling hay and having solid stems). The low shrubs are of the Ericaceae or heath family (blueberries, cranberries, Labrador tea).

Although peatlands are relatively scarce in the St. Lawrence Valley, they are the home of many semi-aquatic migratory birds in central and northern Québec, accommodating several species such as the short-eared owl, palm warbler and Lincoln's sparrow.

6.7 km

25

Keep a close eye on the shore of the St. Lawrence. Depending on its origin, the shore is composed of sand, mud and rock.

Did you notice that the rocky cliff which was to the south at La Pocatière is now to the north? The rocky backbone of the Appalachians, in approaching the St. Lawrence, has shaped the shore along this section of the river. The rocky ridges emerging sometimes from the water, sometimes from the land, are part of this Appalachian spur.



A



B

A. Balsam fir. B. White spruce.

The Îles Pèlerins (Pilgrim Islands) lie a few kilometres off Saint-André-de-Kamouraska. The archipelago's name is derived from mirages caused by the meeting of warm and cold air currents deforming the islands' profiles so that they resemble hooded pilgrims. The five rocky islands are composed mainly of quartzite with a small amount of conglomerate. Their steeply sloped shores rise nearly 50 m above sea level.

White spruce, balsam fir, red pine and jack pine grow on the 140 ha of the archipelago.





Double-crested cormorant.

Peregrine falcon.



26

Le Gros Pêlerin Island, the whitish rock that can be seen from the highway, has the largest area and bird population. The Pêlerins are of vital importance to waterfowl in this part of the estuary. With over 1 000 nesting pairs, the archipelago's double-crested cormorant colony is one of the largest in Canada. The most westerly razorbill colony in the estuary is on the Pêlerins Islands.

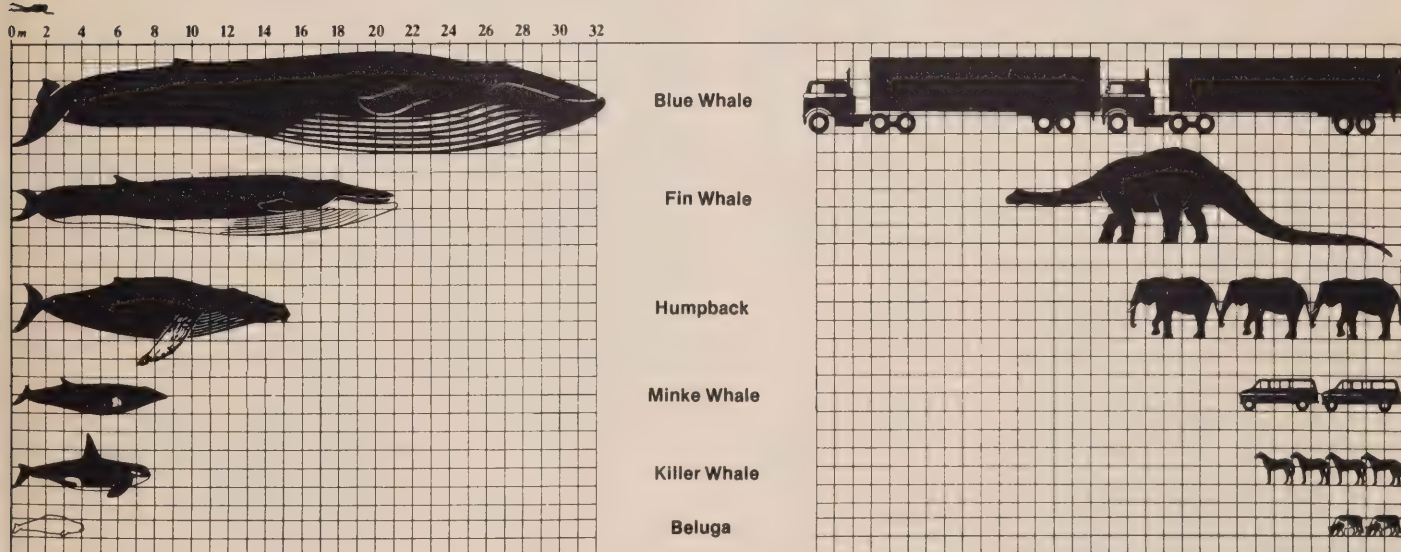
In addition to large great blue heron and black-crowned night heron colonies, the islands are also colonized by gulls, eider ducks and the black guillemot, as well as many black ducks and songbirds.

There is hope that the peregrine falcon, a most regal hunter, will one day choose to nest along the cliffs of one of these islands. This endangered species is particularly fond of such rocky coasts where abundant sea birds provide a ready food supply.

Each year, the St. Lawrence estuary is visited by several species of Cetacea (an order of aquatic mammals that includes whales). Like humans, cetaceans are warm-blooded, breathe air (they must surface regularly to do so) and feed their live-born young on milk.

Toothed cetaceans (Odontoceti) do not chew their food, but swallow it whole. Their teeth are well-suited for seizing and holding slippery prey such as fish. The harbour porpoise, the Atlantic white-sided dolphin and the killer whale are all toothed, as is the beluga, of which there is a distinct population permanently settled in the estuary and the Gulf of St. Lawrence.

The Mysticeti or baleen whales feed on plankton, a multitude of microorganisms including krill (invertebrates resembling tiny shrimp) and fish. The baleen plates are made of keratin (a substance similar to horn) and are arranged like vertical venetian blinds around the mouth of the animal. Baleen plates are attached to the upper jaw, and act as a sieve. To feed, a baleen whale swims along with its mouth open, taking in hundreds of litres of water teeming with small organ-



Shapes and sizes of whales. (From Whales: Fragile Giants of the Sea, National Museum of Natural Sciences, National Museums of Canada).

isms. The whale then uses its tongue to force the water out between the baleen plates, trapping the food inside its mouth. Old-fashioned whalebone corset stays were thin strips carved from baleen plates.



A. Minke Whale. B. Beluga.



The blue whale, the largest animal on earth, feeds on krill. The fin whale and the minke whale are the baleen whales most often found in the estuary. The humpback whale is known for its eccentricity; its many acrobatic antics have earned it the nickname of "sea clown".

Most of these species may be sighted during the summer, but mostly they enter the estuary in August and remain until late October. The *Société linnéenne du Québec*, a scientific society devoted to protecting the environment, has a standing appointment with these mammals and invites you to participate in its ocean science awareness cruises.

10.6 km



Rivière-du-Loup.

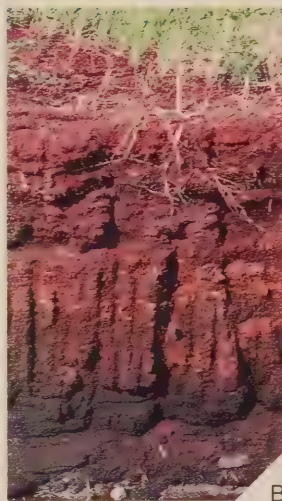
With an illuminated cross overlooking the city, Rivière-du-Loup is built along a mountainside. Visitors are inevitably captivated by the charm of its old houses and by its peaceful atmosphere. Rivière-du-Loup may have been named for the seals (locally called *loup-marins* in French) that formerly gathered in large numbers at the mouth of the river. It may also have been named after the French ship *Le Loup*, which was forced to winter at the mouth of the river around the year 1660.

Rivière-du-Loup Falls, 30 m high and located in the town, is the source of power for a small hydroelectric station. The Musée du Bas-Saint-Laurent (Lower St. Lawrence Museum) on Saint-Pierre Street depicts the cultural and ethnic heritage of the area. To get back on the Trans-Canada Highway, follow the signs for highway 185.

8.7 km

A peatland is visible to the south. To harvest peat from this open bog, trenches are dug to lower the water level and the layer of vegetation is removed from the surface. The surface is then broken up with a harrow. When the peat has dried sufficiently, it is collected by a huge vacuum loader and transported to the processing plant to be shredded and packaged for shipping.

Peat from the Rivière-du-Loup area is fibrous and poorly decomposed; most of it is sold in the United States to enhance lawn soil. It is capable of holding ten to twenty times its weight in water. Peat has many uses. Being very absorbent, it is used for oil spill cleanups at sea. Peat can also be gasified and used as fuel to produce electricity.



B



A

A. Farmed peatland, drainage ditch. B. Layers in a bog. C. Peat vacuum loader.



C

Peat is composed of complex molecules so sugars, waxes, tar and a whole series of products currently extracted from oil can be derived from it after chemical processing. This accumulation of vegetable debris over thousands of years has provided Québec with peat reserves estimated at 640 million tons spread over 19 000 km<sup>2</sup>. In the Lower St. Lawrence area alone, some 1 500 000 m<sup>3</sup> are extracted annually and it is estimated that the supply will last 300 years.

0.6 km



# The Grand Portage



A



B

The scenery changes and grows more mountainous as we leave Rivière-du-Loup. The highway moves away from the St. Lawrence Valley into the Appalachian Mountains, keeping close to the trail once used by Indians: the Grand-Portage.

Some one hundred years ago, the forests were composed of hardwoods and white and red pine. Intensive logging, fires and insects have since changed its initial composition. The woodlands in view are second growth forest that has been partially or completely destroyed by natural or human factors with a predominance of pioneer species such as trembling aspen, often the first tree species to grow after disturbance.

The Appalachians are composed of sedimentary rocks, some of which are more resistant than others. Through the action of the earth's crust, the more resistant layers rose obliquely to the surface, partially covering the less resistant layers. Erosion and the subsequent passage of glaciers carved depressions in the less resistant rock, forming the contrasting relief characteristic of the Appalachians.

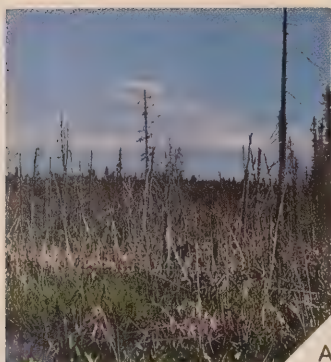
A. The gentle rolling landscape is typical of the Grand-Portage countryside.  
B. Appalachian foothills.



Look ahead carefully: can you make out the steps in the highway? This form of terrain is typical of the Appalachian foothills. The crests, corresponding to layers of resistant rock, are interspersed with depressions where less resistant layers were eroded.

The glacial till deposits left by glaciers, clay sediments from the Champlain Sea and shoreline sand and gravel partially filled these depressions over thousands of years. Fill used for highway construction partly masks these terrain features.





A



B

A. Asphyxiated black spruce.  
B. Unused railroad.

30

A black spruce stand lies trapped in a pool of water. Why?

Rainwater naturally seeks the lowest areas and, in time, a natural drainage system is established. Surface runoff flows via streams into rivers. Usually, drainage is excessive at high points and deficient in depressions. Nevertheless, each ecosystem harbours plants adapted to its degree of moisture. When the highway was built, the natural drainage system was blocked. The road embankments stopped the water flow and drainage became deficient at this location. With moisture conditions altered, the black spruce trees are no longer adapted to their environment. Their roots are dying from asphyxiation in the water-saturated soil.

8.0 km

31

The *Sentier Grand-Portage*, a trail from Notre-Dame du Portage to Lake Témiscouata, an Indian word meaning "deep lake", was first used by Indians as they made their way to Kamouraska to trade furs, then by settlers as a route to the interior.

As early as 1608, the 60 km Grand-Portage made it possible for the French to travel to Port-Royal on the Bay of Fundy. It was widened to three metres in 1750 and was rebuilt entirely following the British conquest.

It was used on several occasions by British troops during conflicts with the Americans, then became part of the postal route between Halifax and Québec City. Few people settled permanently in the Grand-Portage area; only with the advent of the railroad did the area start to develop. The first government after Confederation was given the task of speeding construction of the railroad running along the highway.

Although the Grand-Portage trail is no longer the sole communication route between Québec City and Halifax, part of it is open year-round to hikers.

13.1 km



Gravel pit.

32

A few kilometres southeast of Saint-Honoré, the highway descends into the valley and crosses gravel pits that were probably used in its construction.

These sand and gravel deposits were carried by torrents from the melting of a glacier some eight to ten million years ago. All that is left of these torrential floods is a stream that drains the valley. The highway crosses it and runs beside it for a time before working its way up the other slope towards Saint-Louis-du-Ha!-Ha!.

If you look closely, you may see a few bank swallows, which burrow their nests in the steep sand slopes.

15.9 km

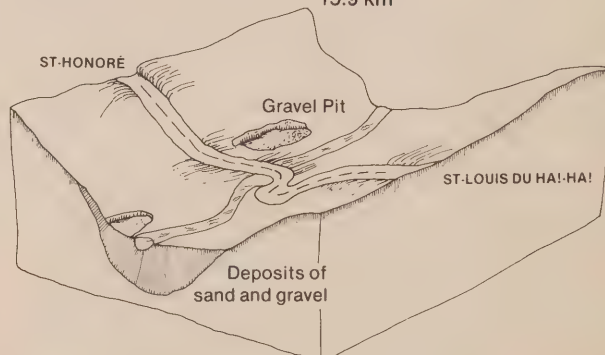


Diagram of the valley where we find the gravel pits. The sand and gravel are at the bottom of the valley. The loose soil on the surrounding hills is very light.





A



B



#### Fort Ingall:

2.7 km from the highway. Turn left at the junction indicated by the road sign "Fort Ingall", then left again at the traffic lights. At the fork, take the road to the left. Fort Ingall will be on your right.



A. Conifers defoliated by the spruce budworm. B. Fort Ingall.

33

Here and there along the highway, conifers have lost their needles. These trees are probably victims of the spruce budworm, the most widespread, tenacious and voracious of many harmful insects causing damage to Canadian forests. Each year, the budworm devastates thousands of hectares of fir and spruce. It usually takes four to five years of repeated defoliation to cause trees to die. Defoliated trees are subject to attack by other insects.

The spruce budworm adults are small brown moths that deposit their eggs on fir and spruce foliage at the end of summer. Larvae that hatch feed on buds the following spring, then on needles, until they transform into pupae. Pupae give rise to moths and the cycle begins anew.

Spruce budworm can be controlled by spraying chemicals or biological insecticides. Aircraft must be used because of the vast areas requiring treatment. The Canadian Forestry Service is researching biological control methods such as the use of specific viruses, bacteria and fungi. The advantage of these control methods is that they have no effect on life forms other than the spruce budworm, ensuring the continued natural balance of forest environments.

34

In 1839, the border dispute between the State of Maine and New Brunswick was mounting and, although the area in question had been declared neutral for the duration of negotiations, British troops established several military posts along the Grand-Portage trail, both to protect the citizens and to ensure that their sole line of winter communication between Québec City and Halifax was kept open.

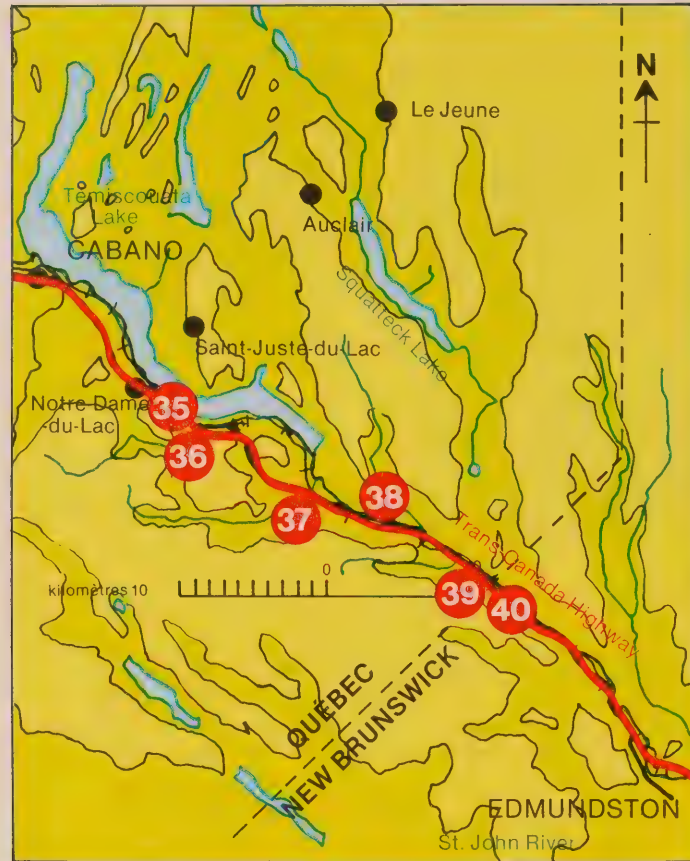
With the signing of the Ashburton Treaty in 1842, the "bloodless war of the Aroostook" (a river in the State of Maine) came to an end without a shot being fired.

In 1862, a new border conflict led the British army to reoccupy these forts; after the conflict was resolved, the forts were deserted and fell into ruin, as they were no longer needed. One of these military posts, Fort Ingall, disappeared completely. According to local legend, the inhabitants of the new village of Cabano used what was left of it to build their houses. Archaeological digs uncovered its remains, and the fort was rebuilt in 1973. Fort Ingall is located on the south shore of Lake Témiscouata, at the end of the Grand-Portage. This was a strategic position because the Bay of Fundy could be reached from the lake by way of the Madawaska and St. John Rivers. Made of wood and protected by a trench and a stockade, Fort Ingall could accommodate two hundred men.

11.1 km



## The Riverbanks of Témiscouata and Madawaska



Témiscouata Lake.

For travellers of the past arriving at Notre-Dame-du-Portage, the sight of Lake Témiscouata meant the end of an exhausting portage. Today, the lake is a cottage and resort area.

The Madawaska River, whose name may mean “marshgrass-at-the-mouth”, has its source in Lake Témiscouata and flows into the Saint John River at Edmundston. Opposite Ville Dégelis is a place where the river never freezes, even during the worst winter cold spells, hence the picturesque name of this locality (in French, *dégel* means thaw).

Beyond Ville Dégelis, the road enters a valley with a small alluvial plain at the bottom. The fine sediments (alluvia), composing the plain were deposited by successive flooding of the Madawaska River. These fertile deposits are good farmland.

35

JAL is situated on the other side of Lake Témiscouata. The name JAL is derived from the grouping of three villages: Saint-Juste-du-Lac, Auclair and Lejeune. Recently settled (Auclair and Lejeune began during the Great Depression of the 1930's), these villages were thought to be marginal by government officials when major developments were planned for eastern Québec and even relocation of the population was considered in 1966.

Far from accepting this decision, the inhabitants of the three villages joined together, combining their initials to form the acronym JAL. They founded the “Coopérative agro-forestière du Témiscouata”, and a forest owner's group. The 2 200 inhabitants of JAL proved that, by taking over their own development via a rational exploitation of forest, agricultural and tourist resources, they can control their destiny.



The *Groupe forestier de l'est du lac Témiscouata* (Eastern Lake Témiscouata Forest Owner's Group), in addition to the JAL, covers the areas of Squatteck, Dégelis and Notre-Dame-du-Lac. Different levels of government provide assistance to the Groupe for its organization, to pay reforestation costs, and to subsidize silvicultural treatments such as regeneration and precommercial thinnings.

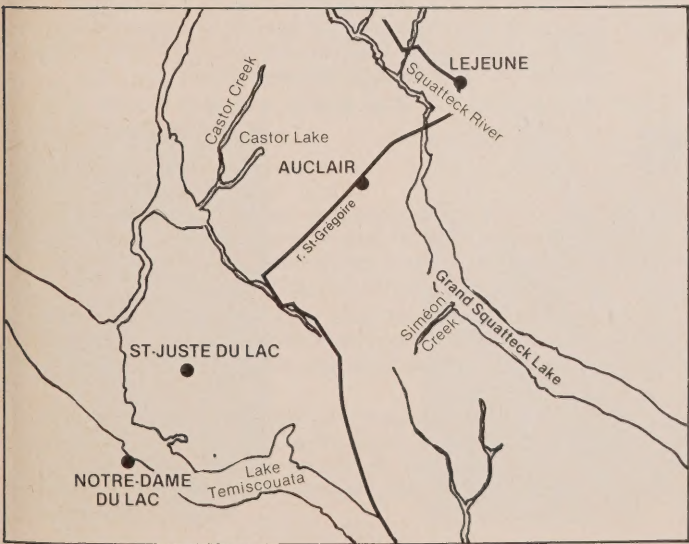
The *Coopérative agro-forestière du Témiscouata* is responsible for projects such as the co-operative sugar bush which, with over 20 000 taps connected via tubing to the sugar house, is one of the largest operations of its type in Québec. Many products in addition to syrup are manufactured from maple sap, including candies which the co-op markets outside the area.

The co-op also produces fir oil and cedar oil distilled from ground softwood branches. These oils are sold outside Canada for use in the pharmaceutical and perfume industries.

\*\*\*\*\*

**JAL:**  
The ferry is free; 1.1 km from the highway. Turn left at the junction indicated by the road sign *Traversier*, then at the STOP, turn right. At the flashing lights, turn left, cross the tracks. The ferry leaves every half hour.

\*\*\*\*\*



Notre-Dame-du-Lac and Saint-Juste-du-Lac Ferry.

Agriculture developed with difficulty in JAL. Although the soil, derived from shales, is suitable for cultivation, the land was difficult to clear and the rolling terrain of the JAL favoured erosion of the more fertile surface layer. Weather was a further restriction: with an annual growing season of 100 frost-free days, some crops, such as corn, could not be grown successfully. Nevertheless, the dairy industry developed and fodder crops were planted extensively.

Although JAL is now turning towards the forest industry, many farmers are not prepared to become full-time silviculturists (forest growers). Instead, they diversify their products, strengthening local agriculture. The co-op has begun growing seed potatoes; their marketing is facilitated by a refrigerated potato cellar. Other projects are sheep breeding and, more recently, fox breeding and hatcheries.



A



B



A. Firewood. B. Conifer plantation, JAL. C. Meadow, JAL.



The highly varied landscape, decorated with forests and fields, its depressions harbouring large lakes interlinked by rivers, either rough or sleepy, makes this little-known area a tourist haven.

In the fall, the *Festival du pointu*, the only one of its kind in Québec, attracts people to Saint-Juste-du-Lac. The *pointu* is a small whitefish with delicate flesh that is netted in Lake Témiscouata.

Local initiatives are quite promising: the "Ranch des Montagnards" provides year-round opportunities for long horseback excursions combined with periods of training.

Some farms accommodate tourists, allowing them to integrate into the community. Living with these tenacious people, one can more readily appreciate the originality of the JAL concept.

1.5 km



A. *Folded rocks.* B. *Lake Témiscouata.* C. *Mountain after a forest fire.*

36

Look closely at the excavated rock cuts along the edge of the highway. You will see crevices in the rock that sometimes reveal a folded structure. These folds are caused by lateral pressures deforming sedimentary rock. Most of the high mountain ranges originated from similar folding, but on a much larger scale. The convex portion of a fold is termed anticlinal, as opposed to the concave or synclinal portion.

5.5 km

37

About 40 000 years ago, the Amerindians, who came from Asia via Alaska, spread unevenly throughout North America as the glaciers melted, moving into Québec about 7 000 years ago. Near the year 1 000 AD, two language groups shared the territory: the semi-sedentary Iroquoians who practiced agriculture and the nomad Algonquians who lived from hunting and fishing. These two groups comprised various nations\* with related dialects.

Guarding their territory jealously, nations and tribes nevertheless had dealings with each other, the nomads trading pelts for products such as corn that would enable them to survive during poor hunting and fishing seasons.

The Témiscouata area has always served as a link between the St. Lawrence River with its trading centres such as Québec and Tadoussac, and the Atlantic region, via the St. John River in New Brunswick. The Indians would come up the Madawaska, cross Lake Témiscouata and, with many portages, travel towards Trois-Pistoles or Rivière-du-Loup. The nations's territorial boundaries were constantly changing as a result of many wars between the Algonquins and Iroquois, French and British allies respectively, to control trade.

The Témiscouata area was occupied mainly by the Etchemin tribe, a member of the Malecite Nation. The Algonkian-speaking nation lived along the St. John River between the Micmacs and the Abnaki.

Unlike their neighbors, the Etchemins practiced agriculture during summer, planting corn and pumpkins along the St. John. In winter they hunted moose and caribou in the surrounding forests.

14.3 km



\*Nation: A group of tribes speaking the same language and occupying a specific territory. For example, the Iroquois Nation is the most important of the Iroquoian language group.

38

Fire is a menace to local woodlands, as can be seen on the mountains north of the highway. Only 20 percent of forest fires are started by lightning; man causes the rest, either because of poorly doused campfires, cigarettes, or a result of logging operations.

Railroads can also cause forest fires: in the past, sparks from coal-fired locomotives set fire to vegetation along the edge of roadbeds. More recently, burning brake parts have detached and set fire to the forest.

Because the land is so vast, fires may go undetected for a few days, causing significant damage. When dry weather increases the risk, aerial observers fly over the forests to detect smoke. Ninety percent of forest fires, however, are detected by the general public.





New vegetation in a burned-over coniferous stand.

The *Sociétés de conservation* (Conservation Societies), responsible for forest conservation in Québec, fight forest fires with water bombers, as well as with tractors and portable motor-driven pumps. Portable radios facilitate remote communication. However, prevention remains the best way to fight forest fires.

6.3 km

39

Two carnivorous plants in Québec are found in peatlands; they are the pitcher-plant, the flower-emblem of Newfoundland, and the sundew. Both feed on insects and are perennials (living more than one year).

The basal leaves of the pitcher-plant are vase-shaped and the interior is covered with hairs pointing downwards. Insects attracted by its flowers venture into the leaves and are unable to escape because of the orientation of the hairs. Frequently the insects drown in rainwater that collects and stagnates at the bottom of the leaf; the plant then feeds on the decomposing insects.



A



B

A. Sundew. B. Pitcher-plant.

The sundew, smaller than the pitcher-plant, also uses its leaves to feed. The spatulate leaves are covered on one side with gland-tipped hairs. Insects stick to the secretions on these hairs and are unable to free themselves. The leaf then folds very slowly inwards, imprisoning the insect and digesting it. After two or three catches, the leaf loses the ability to close and is replaced by others. In Scandinavia, sundew juice is extracted and is used for souring milk.



Lancaster bomber.

The highway runs beside peatland dotted with lily ponds. Water lilies are an important part of the moose's diet and the moose tracks can readily be found in the clear, brown fibrous layers of peat soil.

40

2.4 km

A comfortable tourist information centre, full of maps and leaflets, welcomes visitors to the province of New Brunswick. Across the road, the Edmundston Municipal Airport proudly exhibits a Lancaster bomber used by the Allies during the Second World War.

Farther on is the Automobile Museum, and finally, 15 km from the border, lies the city of Edmundston, capital of the legendary Republic of Madawaska. During the border conflicts between the United States and Great Britain which lasted nearly a century, the Madawaska population was left without allegiance to either government and developed nationalistic feelings towards the Republic of Madawaska. Founded in 1820, Edmundston has a population of 14 000 inhabitants; its main industry is pulp and paper.





Environment  
Canada

Environnement  
Canada

Canadian  
Forestry  
Service

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canadien  
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Contribution to the  
Man and the Biosphere  
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Contribution au  
Programme l'homme  
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### Our Forest Environment and the Canadian Forestry Service

Canada enjoys a prominent place among the forest nations of the world because of the volume and variety of its forest products. But now, with growing understanding of the forest's role in the great ecological complex, Canadians begin to perceive its broader values as a stabilizer of natural environments and as a retreat for relaxation and well-being of people living in crowded cities.

The Canadian Forestry Service, Department of the Environment, is concerned with the forest environment and the forest industries. Its objective is to promote the most efficient management and use of Canada's forest resources compatible with environmental concerns by:

- conducting research and development in the forest management and forest products fields;
- disseminating information and providing technical services to provincial governments, forest industries, other agencies and the general public;
- providing grants to universities to encourage research in forestry.

### Suggested Reading

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